

Appln No. 09/846,738

Amdt date April 30, 2004

Reply to Office action of December 31, 2003

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A steerable catheter comprising:
an elongated, flexible tubular catheter body having proximal and distal ends and a lumen extending therethrough;
a tip section at the distal end of the catheter body, the tip section comprising a flexible plastic tubing having a core and an outer layer surrounding the core, the core having at least one off-axis lumen extending therethrough;
a control handle at the proximal end of the catheter body;
a puller wire extending through the off-axis lumen of the tip section and lumen of the catheter body, and having a proximal end anchored to the control handle and a distal end anchored to the tip section, whereby the puller wire is longitudinally moveable relative to the catheter body to cause deflection of the tip section in a plane in a first direction;
and
one or more stabilizing features extending longitudinally along at least a portion of the length of the tip section and positioned in the outer layer of the tip section generally symmetrically about a diameter of the tip section corresponding to the plane in which the tip section is deflectable, the one or more stabilizing features comprising a material that has a higher modulus of elasticity than the plastic of the tip section

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~~[wherein the tip section tubing comprises a core and an outer layer surrounding the core].~~

2. (Original) A catheter according to claim 1, wherein the tip section is more flexible than the catheter body.

3. (Original) A catheter according to claim 1, wherein the one or more stabilizing features are generally rigid in place relative to the tip section.

4. (Cancelled)

5. (Previously Presented) A catheter according to claim 1, wherein two stabilizing features are provided in the outer layer on opposite sides of the core.

6. (Original) A catheter according to claim 5, wherein each stabilizing feature comprises a metal rod.

7. (Original) A catheter according to claim 6, wherein the metal rods are coextruded with the outer layer.

8. (Original) A catheter according to claim 5, wherein each stabilizing feature comprises a plastic strip.

9. (Original) A catheter according to claim 8, wherein the plastic strips are coextruded with the outer layer.

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10. (Original) A catheter according to claim 5, wherein the tip section further comprises a braided mesh between the outer layer and the core.

11. (Original) A catheter according to claim 10, wherein the tip section further comprises an inner layer between the braided mesh and the core.

12. (Previously Presented) A catheter according to claim 1, wherein the tip section further comprises a braided mesh between the outer layer and the core.

13. (Cancelled)

14. (Cancelled)

15. (Currently Amended) A catheter according to claim 1, having a second off-axis lumen in the core of the tip section and further comprising a second puller wire extending through the second off-axis lumen, the second puller wire having a proximal end anchored to the control handle and a distal end anchored to the tip section, whereby the puller wire is longitudinally moveable relative to the catheter body to cause deflection of the tip section in the plane in a second direction opposite the first direction.

16. (Original) A catheter according to claim 15, wherein the tip section is more flexible than the catheter body.

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17. (Original) A catheter according to claim 15, wherein the one or more stabilizing features are generally rigidly in place relative to the tip section.

18. (Cancelled)

19. (Previously Presented) A catheter according to claim 15, wherein two stabilizing features are provided in the outer layer on opposite sides of the core.

20. (Original) A catheter according to claim 19, wherein each stabilizing feature comprises a metal rod.

21. (Original) A catheter according to claim 20, wherein the metal rods are coextruded with the outer layer.

22. (Original) A catheter according to claim 19, wherein each stabilizing feature comprises a plastic strip.

23. (Original) A catheter according to claim 22, wherein the plastic strips are coextruded with the outer layer.

24. (Original) A catheter according to claim 19, wherein the tip section further comprises a braided mesh between the outer layer and the core.

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25. (Original) A catheter according to claim 24, wherein the tip section further comprises an inner layer between the braided mesh and the core.

26. (Previously Presented) A catheter according to claim 15, wherein the tip section further comprises a braided mesh between the outer layer and the core.

27. (Previously Presented) A catheter according to claim 1, wherein the one or more stabilizing features each have a generally round cross-sectional area.

28. (Cancelled)

29. (Previously Presented) A catheter according to claim 1, wherein the core comprises a first material and the outer layer comprises a second material that is different from the first material.

30. (Previously Presented) A catheter according to claim 1, wherein the core comprises a substantially solid material.

31. (Currently Amended) A steerable catheter comprising:
an elongated, flexible tubular catheter body having proximal and distal ends and a lumen extending therethrough;
a tip section at the distal end of the catheter body, the tip section comprising a flexible plastic tubing comprising a core and an outer layer surrounding the core, the core having a

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longitudinal axis and at least one off-axis lumen extending therethrough;

a control handle at the proximal end of the catheter body;

a puller wire extending through the off-axis lumen of the core of the tip section and lumen of the catheter body, and having a proximal end anchored to the control handle and a distal end anchored to the tip section, whereby the puller wire is longitudinally moveable relative to the catheter body to cause deflection of the tip section in a plane in a first direction; and

one or more stabilizing features extending longitudinally along at least a portion of the length of the tip section and positioned generally symmetrically about a diameter of the tip section corresponding to the plane in which the tip section is deflectable, the one or more stabilizing features also extending from or through the longitudinal axis and comprising a material that has a higher modulus of elasticity than the plastic of the tip section, wherein the one or more stabilizing features extend through the longitudinal axis of the core of the tip section.

32. (New) A catheter according to claim 31, wherein two stabilizing features are provided in the core and each stabilizing feature extends from the longitudinal axis.

33. (New) A catheter according to claim 31, wherein a single stabilizing feature is provided in the core and extends through the longitudinal axis.

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34. (New) A catheter according to claim 36, wherein the stabilizing features are coextruded with the core.

35. (New) A steerable catheter comprising:
an elongated, flexible tubular catheter body having proximal and distal ends and a lumen extending therethrough;
a tip section at the distal end of the catheter body, the tip section comprising a flexible plastic tubing having at least two off-axis lumens extending therethrough;
a control handle at the proximal end of the catheter body;
at least two puller wires extending through the lumen of the catheter body, whereby each puller wire has a proximal end anchored to the control handle and a distal end anchored to the tip section, is longitudinally moveable relative to the catheter body and extends through a different one of the off-axis lumens of the tip section to cause deflection of the tip section in a plane in a different direction; and
one or more stabilizing features extending in a first dimension along at least a portion of the length of the tip section and having a portion extending in a second dimension between the two off axis lumens, the one or more stabilizing features comprising a material that has a higher modulus of elasticity than the plastic of the tip section.

36. (New) A steerable catheter of claim 35, wherein the stabilizing feature has a generally rectangular cross-sectional area.

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37. (New) A steerable catheter of claim 35, wherein each of the stabilizing features has a generally pie-shaped cross-sectional area.

38. (New) A steerable catheter of claim 35, wherein the one or more stabilizing features extend across the tip section along a diameter in the second dimension thereof generally perpendicular to the plane of deflection of the tip section.

39. (New) A steerable catheter of claim 35, wherein the tip section includes a core and an outer layer surrounding the core.

40. (New) A steerable catheter of claim 39, wherein the lumens, the puller wires and the stabilizing features are positioned in the core.